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(58) Field of Search

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(54) **Insecticidal aerosol spray compositions characterised by the absence of a fragrance or masking agent**

(57) In this application, there is disclosed an insecticidal composition in aerosol form comprising:

(a) one or more insecticides in an amount of 0.01 to 2.0 % w/w;

(b) one or more non-aqueous solvents in an amount of 40 to 95 % w/w; and

(c) from 5 to 60 % w/w of one or more propellants (or where the propellant is a compressed gas, 2 to 10 % w/w);

the composition being characterised by the exclusion of perfumes and/or masking agents.

Insecticidal compositions are perceived by users as irritating to the nose and unduly strong and unpleasant in odour. This disadvantage is irrespective of the actual insecticidal activity. Consequently, users are reluctant or at least inhibited in their use of such compositions.

In the art, attempts have been made to overcome the irritation and odour problem by including perfumes and masking agents in compositions.

It has now been found that it is possible to formulate an insecticidal aerosol spray, particularly a surface spray, having low or substantially no odour and/or substantially reduced nasal irritancy by ensuring that no perfumes or masking agents are included in such compositions.

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Improvements in or relating to organic compositions

Technical Field

5 This invention relates to insecticidal aerosol spray compositions having reduced nasal irritancy and relatively low odour, particularly to those compositions used as surface sprays.

Background Art

A number of methods are known to deal with insects, particularly crawling insects such as cockroaches. One is the use of baits and traps. Another method is the use of insecticidal aerosol sprays.

10 One of the advantages of the aerosol spray is that it can be sprayed directly onto the insect for a fast kill.

A further advantage is that it can be sprayed onto a surface to produce long lasting protection. For example, to keep cockroaches at bay, an insecticidal aerosol composition can be sprayed onto skirting boards, under cupboards, stoves and
15 drawers.

These compositions have general applicability in the control of many crawling insect pests in addition to cockroaches, including ants, fleas, silverfish, spiders, clothes moths, carpet beetles, Portuguese millipedes and bed bugs.

20 The term "insecticide" is well known in the art and includes orthodox chemical insecticides and appropriate insect virus, bacterial or hormone compositions able to affect the specific insect species to be controlled.

A substantial disadvantage of these compositions is that they are perceived by users as irritating to the nose and unduly strong and unpleasant in odour. This disadvantage is irrespective of the actual insecticidal activity.

25 Consequently, users are reluctant or at least inhibited in their use of such compositions.

In the art, attempts have been made to overcome the irritation and odour problem by including perfumes and masking agents in compositions. To a certain extent, these measures have in part been successful in that it is possible
30 to reduce irritancy and odour, although not to a satisfactory or sufficient extent.

Surprisingly it has now been found that it is possible to formulate an insecticidal aerosol spray, particularly a surface spray, having low or substantially no odour and/or substantially reduced nasal irritancy.

35 This has been achieved by realising that in particular aerosol insecticidal spray compositions, the inclusion of perfumes and so-called odour masking agents contribute to the perceived odour and nasal irritancy of these compositions.

Accordingly, by ensuring that no perfumes or masking agents are included in such compositions, low or no odour and/or substantially reduced nasal irritancy insecticidal aerosol spray compositions may be achieved.

Disclosure of the Invention

5 According to the present invention there is provided an insecticidal composition in aerosol form comprising:

- (a) one or more insecticides in an amount of 0.01 to 2.0 % w/w;
 - (b) one or more non-aqueous solvents in an amount of 40 to 95 % w/w; and
 - 10 (c) from 5 to 60 % w/w of one or more propellants or where the propellant is a compressed gas, 2 to 10 % w/w;
- characterised in that perfumes and/or masking agents are excluded from the composition.

15 In a further aspect, the present invention provides an insecticidal composition in aerosol form consisting of:

- (a) one or more insecticides in an amount of 0.01 to 2.0 % w/w;
- (b) one or more non-aqueous solvents in an amount of 40 to 95 % w/w;
- (c) from 5 to 60 % w/w of one or more propellants or where the propellant is a compressed gas, 2 to 10% w/w; and
- 20 (d) optionally one or more substances selected from the group consisting of insecticide synergists, corrosion inhibitors, preservatives, antioxidants and abrasive materials.

25 In still a further aspect, the present invention provides a method for controlling crawling insects, comprising spraying onto a surface over which insects may crawl an insecticidal composition either comprising

- (a) one or more insecticides in an amount of 0.01 to 2.0 % w/w;
 - (b) one or more non-aqueous solvents in an amount of 40 to 95 % w/w; and
 - (c) from 5 to 60 % w/w of one or more propellants or where the propellant is a compressed gas, 2 to 10% w/w;
 - 30 characterised in that perfumes and/or masking agents are excluded from the composition or consisting of
- (a) one or more insecticides in an amount of 0.01 to 2.0 % w/w;
 - (b) one or more non-aqueous solvents in an amount of 40 to 95 % w/w;
 - (c) from 5 to 60 % w/w of one or more propellants or where the propellant is a compressed gas, 2 to 10 % w/w; and
 - 35

(d) optionally one or more substances selected from the group consisting of insecticide synergists, corrosion inhibitors, preservatives, antioxidants and abrasive materials.

Throughout this specification, all percentages are w/w unless otherwise stated. In the case of active ingredients, percentages are expressed on a 100% active basis.

Preferably the compositions of the invention are in the form of surface sprays, particularly for use in controlling crawling insects.

Solvent

In order to maintain the insecticide(s) in solution, a solvent is incorporated in the compositions of the invention in an amount of from 40 to 95%. Generally, the solvent will be miscible with the propellant(s) so as to form a continuous phase. This of course will not be the case when compressed gas is used as a propellant.

A wide range of solvent materials may be used, although care should be exercised to ensure that the solvent does not adversely affect insecticidal activity.

Furthermore, it should be noted that combinations of solvents may be used.

Examples of solvents that may be used in the compositions of the invention include:-

liquid n-paraffins, liquid isoparaffins, cycloalkanes, naphthene-containing solvents, white spirit, kerosene, aromatic solvents, mineral turpentine, ester solvents, silicone solvents or oils, turpenes, fatty acids, linear alkylbenzene, dialkyl phthalates, C₅-C₁₁ alcohols and fatty alcohols. Specific examples of these are as follows:-

liquid n-paraffins-Norpar 12, Norpar 13 and Norpar 15 (available from Exxon)

liquid isoparaffins-Isopar G, Isopar H, Isopar L, Isopar M and Isopar V (available from Exxon)

Naphthene-containing solvents-Exxsol D40, Exxsol D60, Exxsol D80, Exxsol D100, Exxsol D110, Nappar 10 (available from Exxon)

Ester solvents-such as alkyl acetates, examples being Exxate 1000, Exxate 1300 (available from Exxon), and Coasol (available from Chemoxy International);

Silicone solvents oils-Dow Corning 244, 245, 344 and 345 fluids,

Fatty amines - soya amines, tallow amines, cocoamines,

Fatty acids - caprylic acid, caproic acid, capric acid, lauric acid, myristic acid, palmitic acid, stearic acid, behenic acid, oleic acid,

Fatty alcohols - octanol, dodecanol, lauryl alcohol, myristyl alcohol, cetyl alcohol, stearyl alcohol, cetostearyl alcohol, oleyl alcohol,

Preferred solvents are liquid hydrocarbon solvents, n-paraffins, and iso-paraffins.

5 Although the solvent may be incorporated at a level of from 40 to 95%, preferably the concentration will be in the range of 60 to 80%, most preferably about 65%.

Propellants

10 One or more propellants are used in the composition of the invention in a total amount of from 5 to 60%. Amongst the propellants that may be used are hydrocarbons, dimethylether and compressed gas of which hydrocarbons are preferred.

15 In the case of the hydrocarbon propellants those that may be used are acetylene, methane, ethane, ethylene, propane, propene, n-butane, nu-butene, isobutane, isobutene, pentane, pentene, isopentane and isopentene. Mixtures of these propellants may also be used. Indeed, it should be noted that commercially available propellants typically contain a number of hydrocarbon gases. For example, an odourised commercial butane, available from Boral gas contains predominantly n-butane and some iso-butane along with small amounts of propane, propene, pentane and butene.

20 Preferred hydrocarbon propellants include propane, n-butane, isobutane, pentane and isopentane, whilst most preferred are propane, iso-butane and n-butane.

 Particularly preferred hydrocarbon propellants are mixtures of propane, n-butane and iso-butane.

25 Whilst broadly the concentration of hydrocarbon propellant will be from 5 to 60%, generally the concentration will be from 20 to 50%, preferably 25 to 45% most preferably about 30 to 40%.

30 When compressed gases are used as a propellant generally these will be carbon dioxide, nitrogen or air. Usually, they will be used at a concentration of 2 to 10%, preferably about 5%.

35 The person skilled in the art will appreciate that the pressure in an aerosol package will be determined by propellant or mixture of propellant. This pressure will have a determining effect on spray rates. Hence for any particular valve system, varying the propellant or propellant mixture will allow for the selection of a desired spray rate.

Likewise for a particular propellant or propellant mixture, it is possible to select a valve and actuator system to achieve a desired rate.

Insecticides

5 A wide range of active insecticides may be used including pyrethroids, particularly synthetic pyrethroids, chlorpyrifos and diazinon.

Preferred insecticides are pyrethrins, synthetic pyrethroids, cyanopyrethroids, carbamates and organophosphorus compounds. Particularly preferred are mixtures of two or more synthetic pyrethroids and cyanopyrethroids.

10 When a synthetic pyrethroid such as imiprothrin is used, generally it will be incorporated in an amount to give a concentration at the lower end of the range, i.e. 0.01% or more.

Synthetic pyrethroids such as lambda cyhalothrin will generally be incorporated in higher concentrations of about 0.06% or more.

15 Other synthetic pyrethroids such as cypermethrin, permethrin and tetramethrin will generally be incorporated to give a concentration of about 0.1% or 0.4% respectively or more.

Chlorpyrifos and diazinon will generally be incorporated to give concentrations in the range of 0.5 to 0.9% or about 0.6% respectively.

20 For most applications, the preferred concentration of insecticide will be 0.01 to 1%.

Optional Ingredients

In order to maximise the effectiveness of the insecticidal activity of the compositions of the invention, synergists such as MGK-264 (N-octylbicycloheptene dicarboximide) and piperonyl butoxide may be included in a
25 concentration of 0.5-1.5%, most preferably about 1.0% for use in conjunction with pyrethroid insecticides.

In addition, other ingredients including corrosion inhibitors, such as 1-hydroxyethyl-2-heptadecenyl imidazoline and/or sodium benzoate, preferably in a concentration from 0.01 to 0.5%, preservatives and antioxidants may be used as
30 required.

Effectiveness may also be enhanced by including an abrasive material such as silica. It is thought that these abrasive materials act to aid in the penetration of an insect's exoskeleton by an insecticide when an insect contacts the abrasive on a

surface deposited after the spraying of the composition of the invention. It is also thought that by absorption the insecticide is held on the surface of the insect, thereby enhancing contact between insecticide and insect.

Typically an abrasive material may be incorporated in a concentration of about 0.01 to 5%, preferably about 0.05 to 0.5%.

Preparation

The compositions of the invention may be prepared by dissolving the insecticides(s) in the solvent. Optional ingredients which are soluble in the solvent will be dissolved whilst other optional ingredients will be dispersed to form a concentrate.

The concentrate is then blended with propellant and filled into cans.

Alternatively, the concentrate and the propellant may be filled into cans together.

Nasal Irritancy and Odour

The compositions of the invention have low or substantially no odour and/or reduced nasal irritancy. According to the method outlined below, on initial spraying the nasal irritancy is less than 40, preferably less than 30 and most preferably less than 20.

Likewise on initial spraying, the odour is less than 40, preferably less than 30, most preferably less than 20.

Sensory Evaluation

In order to determine the odour and irritancy of compositions, the following method was used.

1. A person walks into a room and smells the air as a sample of the composition undergoing evaluation is sprayed against a mock skirting board for 6 seconds.
2. After five minutes the person returns to the room and smells the air again.
3. The person then marks on a 100mm straight line scale (0mm = not irritating, 100mm = very irritating) to indicate how irritating they found the composition to be initially and after five minutes.

4. In like manner, the person marks a second 100mm straight line (0mm - no odour, 100mm = very strong odour) to indicate the strength of the compositions odour initially and after five minutes).

5 A sufficient number of persons are used so as to obtain statistically significant results.

Scoring

Irritancy

10 Scores over 70 indicate that a composition is extremely irritating. A score of 40-50 indicates that a composition is mildly irritating whilst a score below 40 indicates a non-irritating composition.

Odour

Scores over 70 indicate that a composition has an extremely strong odour whilst 50-70 indicates a reasonably strong odour. A score of 40-50 indicates a weak odour whilst below 40 indicates that a composition has a very weak odour.

15 In order to better understand the nature of this invention, an example will now be described.

Example 1

<u>Ingredient</u>	<u>% w/w</u>
Permethrin 93	0.300
Tetramethrin 92	0.150
Norpar 12	64.435
BHT	0.005
Aerosil R972	0.010
Sipernat 22S	0.100
H55	35.00

Ingredients and Availability

·Permethrin 93%: Permethrin 93% (Sumitomo)

Tetramethrin 92%: Tetramethrin 92% (Sumitomo)

Norpar 12: Liquid n-paraffin (Exxon)

5 BHT: butylatedhydroxytoluene (FMC Corp)

Aerosil R972: colloidal silica (Degussa)

Sipernat 22S: colloidal silica (Degussa)

H55: propane butane blend - 9.1%/25.9% (Boral)

The example was prepared according to the method previously described.

10 Sensory Evaluation

The nasal irritancy and odour of Example 1 was determined according to the sensory evaluation method previously described. For comparative purposes, a commercially available product was also evaluated. The results are set out in Table 1.

15

TABLE 1

	<u>Nasal Irritancy</u>		<u>Odour</u>	
	Initial	5 mins	Initial	5 minutes
Example 1	19	18	21	18
Commercial product	62	57	79	71

At the 95% confidence level, Example 1 was found to be significantly less irritating and with a significantly lower odour.

20 The insecticidal activity was also evaluated using standard methods and found to be entirely satisfactory.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects

5 as illustrative and not restrictive.

CLAIMS:

1. An insecticidal composition in aerosol form comprising:
 - (a) one or more insecticides in an amount of 0.01 to 2.0 % w/w;
 - (b) one or more non-aqueous solvents in an amount of 40 to 95 % w/w; and
 - 5 (c) from 5 to 60 % w/w of one or more propellants or where the propellant is a compressed gas, 2 to 10%;
 characterised in that perfumes and/or masking agents are excluded from the composition.
2. An insecticidal composition in aerosol form consisting of:
 - 10 (a) one or more insecticides in an amount of 0.01 to 2.0 % w/w;
 - (b) one or more non-aqueous solvents in an amount of 40 to 95 % w/w;
 - (c) from 5 to 60 % w/w of one or more propellants or where the propellant is a compressed gas, 2 to 10%; and
 - 15 (d) optionally one or more substances selected from the group consisting of insecticide synergists, corrosion inhibitors, preservatives, antioxidants and abrasive materials.
3. An insecticidal composition as in claim 1 or claim 2, wherein the nasal irritancy on initial spraying is less than 40, preferably less than 30 and most preferably less than 20.
- 20 4. An insecticidal composition as in any one of claims 1 to 3, wherein the odour on initial spraying is less than 40, preferably less than 30, most preferably less than 20.
5. An insecticidal composition as in any one of claims 1 to 4, including 0.01 to 1.0%, preferably 0.1 to 0.5% of one or more insecticides.
- 25 6. An insecticidal composition as in any one of claims 1 to 5, including two insecticides.
7. An insecticidal composition as in any one of claims 1 to 6, including 60 to 80%, preferably about 65% of one or more non-aqueous solvents.
8. An insecticidal composition as in any one of claims 1 to 7, wherein the non-
 - 30 aqueous solvent is selected from the group consisting of liquid hydrocarbon solvents, n-paraffins and iso-paraffins.
9. An insecticidal composition as in any one of claims 1 to 8, including 20 to 50 %, preferably 25 to 45 %, most preferably about 30 to 40% of one or more hydrocarbon propellants.
- 35 10. An insecticidal composition as in claim 9, including two propellants.

11. An insecticidal composition as in claim 10, including a mixture of propane and butane.
12. A method for controlling crawling insects, comprising spraying onto a surface over which insects may crawl an insecticidal composition either comprising
- 5 (a) one or more insecticides in an amount of 0.01 to 2.0 % w/w;
- (b) one or more non-aqueous solvents in an amount of 40 to 95 % w/w; and
- (c) from 5 to 60 % w/w of one or more propellants or where the propellant is a compressed gas, 2 to 10%;
- characterised in that perfumes and/or masking agents are excluded from the
- 10 composition or consisting of
- (a) one or more insecticides in an amount of 0.01 to 2.0 % w/w;
- (b) one or more non-aqueous solvents in an amount of 40 to 95 % w/w;
- (c) from 5 to 60 % w/w of one or more propellants or where the propellant is a compressed gas, 2 to 10%; and
- 15 (d) optionally one or more substances selected from the group consisting of insecticide synergists, corrosion inhibitors, preservatives, antioxidants and abrasive materials.
13. A method as in claim 12, wherein the insecticidal composition has a nasal irritancy on initial spraying less than 40, preferably less than 30 and most preferably
- 20 less than 20.
14. A method as in claim 12 or claim 13, wherein the insecticidal composition has an odour on initial spraying less than 40, preferably less than 30, most preferably less than 20.
15. A method as in any one of claims 12 to 14, wherein the insecticidal
- 25 composition includes 0.01 to 1.0%, preferably 0.1 to 0.5% of one or more insecticides.
16. A method as in any one of claims 12 to 15, wherein the insecticidal composition includes two insecticides.
17. A method as in any one of claims 12 to 16, wherein the insecticidal
- 30 composition includes 60 to 80%, preferably about 65% of one or more non-aqueous solvents.
18. A method as in any one of claims 12 to 17, wherein the insecticidal composition includes a non-aqueous solvent selected from the group consisting of liquid hydrocarbon solvents, n-paraffins and iso-paraffins.

19. A method as in any one of claims 12 to 18, wherein the insecticidal composition includes 20 to 50 %, preferably 25 to 45 %, most preferably about 30 to 40% of one or more hydrocarbon propellants.

5 20. A method as in claim 19, wherein the insecticidal composition includes two propellants.

21. A method as in claim 20, wherein the insecticidal composition includes a mixture of propane and butane.

22. An insecticidal composition in aerosol form as herein before described with reference to Example 1.

10



Application No: GB 9613909.2
Claims searched: 1-22

Examiner: Stephen Quick
Date of search: 3 October 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): A5E (ES)

Int CI (Ed.6): A01N 25/06

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB0813767 A (H J ADAIR), see whole document, especially example 3	1-22
X	EP0125471 A2 (WELLCOME FOUNDATION), see whole document, especially examples 1-7	1-22
X	WO92/04419 A1 (SOLTEC RESEARCH), see page 9, lines 23-end	1-22
X	US4234567 A (L T FLANNER), see whole document, especially table in columns 1 & 2	1-22

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.